CLAIMS

What is claimed is:

1. A method for preserving data in a data storage system, the method comprising:

    receiving a command to preserve data in the data storage system;

    executing, for a first data, a first input/output (I/O) process directed to a first storage volume, wherein the first I/O process begins at a first time which is prior to receiving the command;

    creating a data structure, in response to the command, for at least a second image which corresponds to a second storage volume;

    writing a second data directed to the first storage volume as part of a second I/O process which begins after the first time; and

    determining from the data structure whether data corresponding to the second data is stored in the second image and if it is, modifying the data structure to indicate that the second data is not stored in the second image and storing the second data in the first image.

2. The method of claim 1, wherein the first storage volume is a first virtual logical unit (VLUN) and the second storage volume is a second VLUN.

3. The method of claim 1, wherein the determining comprises:

    examining a lookup table to determine whether there is an entry associated with a data block for the second data, the lookup table being associated with the second storage image; and

    deleting the entry associated with the data block if the entry exists.

4.   The method of claim 1, further comprising:

acquiring a lock from a lock mechanism before modifying the data structure to

indicate that the second data is not stored in the second image; and

releasing the lock after storing the second data in the first image.

5.   The method of claim 4, wherein the lock mechanism is maintained independent to the

first and the second storage images.

6.   The method of claim 1, further comprising:

receiving a third data being written to a data block of the second storage volume;

updating the data structure to indicate the data block is stored on the second storage

image; and

writing the third data to the data block on the second image.

7.   The method of claim 6, wherein the updating comprises:

determining whether the data block is stored on the first storage image; and

updating the data structure to indicate the data block is stored on the second storage

image, if the data block is stored on the first image.

8.   The method of claim 7, wherein the determining comprises:

examining a lookup table to determine whether there is an entry associated with the

data block, the lookup table being associated with the second storage image;

and

creating the entry associated with the data block if the entry does not exist.

9. The method of claim 6, further comprising:

   acquiring a lock from a lock mechanism before the updating; and

   releasing the lock after the writing.

10. The method of claim 9, wherein the lock mechanism is maintained independent to the first and the second storage images.

11. The method of claim 1, further comprising:

   receiving a request to read from a data block on the second storage volume;

   determining whether the data block is stored in the first image or the second image, based the data structure associated wtih the second storage image;

   reading the data block from the first image if the data block is stored in the first image; and

   reading the data block from the second image if the data block is stored in the second image.

12. The method of claim 11, further comprising examining a lookup table to determine whether there is an entry associated with the data block, the lookup table being associated with the second storage image.

13. The method of claim 11, further comprising:

   acquiring a lock from a lock mechanism before the determining; and

   releasing the lock after the reading.

14. The method of claim 13, wherein the lock mechanism is maintained independent to the first and the second storage images.

15. A machine-readable medium having executable code to cause a machine to perform a method for preserving data in a data storage system, the method comprising:

receiving a command to preserve data in the data storage system;

executing, for a first data, a first input/output (I/O) process directed to a first storage volume, wherein the first I/O process begins at a first time which is prior to receiving the command;

creating a data structure, in response to the command, for at least a second image which corresponds to a second storage volume;

writing a second data directed to the first storage volume as part of a second I/O process which begins after the first time; and

determining from the data structure whether data corresponding to the second data is stored in the second image and if it is, modifying the data structure to indicate that the second data is not stored in the second image and storing the second data in the first image.

16. The machine-readable medium of claim 15, wherein the first storage volume is a first virtual logical unit (VLUN) and the second storage volume is a second VLUN.

17. The machine-readable medium of claim 15, wherein the determining comprises:

examining a lookup table to determine whether there is an entry associated with a data block for the second data, the lookup table being associated with the second storage image; and

deleting the entry associated with the data block if the entry exists.

18. The machine-readable medium of claim 15, wherein the method further comprises:

acquiring a lock from a lock mechanism before modifying the data structure to

indicate that the second data is not stored in the second image; and

releasing the lock after storing the second data in the first image.

19. The machine-readable medium of claim 18, wherein the lock mechanism is maintained

independent to the first and the second storage images.

20. The machine-readable medium of claim 15, wherein the method further comprises:

receiving a third data being written to a data block of the second storage volume;

updating the data structure to indicate the data block is stored on the second storage

image; and

writing the third data to the data block on the second image.

21. The machine-readable medium of claim 20, wherein the updating comprises:

determining whether the data block is stored on the first storage image; and

updating the data structure to indicate the data block is stored on the second storage

image, if the data block is stored on the first image.

22. The machine-readable medium of claim 21, wherein the determining comprises:

examining a lookup table to determine whether there is an entry associated with the

data block, the lookup table being associated with the second storage image;

and

creating the entry associated with the data block if the entry does not exist.

23. The machine-readable medium of claim 20, wherein the method further comprises:

acquiring a lock from a lock mechanism before the updating; and

releasing the lock after the writing.

24.   The machine-readable medium of claim 23, wherein the lock mechanism is maintained independent to the first and the second storage images.

25.   The machine-readable medium of claim 15, wherein the method further comprises:

receiving a request to read from a data block on the second storage volume;

determining whether the data block is stored in the first image or the second image, based the data structure associated wtih the second storage image;

reading the data block from the first image if the data block is stored in the first image; and

reading the data block from the second image if the data block is stored in the second image.

26.   The machine-readable medium of claim 25, wherein the method further comprises examining a lookup table to determine whether there is an entry associated with the data block, the lookup table being associated with the second storage image.

27.   The machine-readable medium of claim 25, wherein the method further comprises:

acquiring a lock from a lock mechanism before the determining; and

releasing the lock after the reading.

28.   The machine-readable medium of claim 27, wherein the lock mechanism is maintained independent to the first and the second storage images.

29.   An apparatus for preserving data in a data storage system, comprising:

means for receiving a command to preserve data in the data storage system;

means for executing, for a first data, a first input/output (I/O) process directed to a first

storage volume, wherein the first I/O process begins at a first time which is

prior to receiving the command;

means for creating a data structure, in response to the command, for at least a second

image which corresponds to a second storage volume;

means for writing a second data directed to the first storage volume as part of a second

I/O process which begins after the first time; and

means for determining from the data structure whether data corresponding to the

second data is stored in the second image and if it is, modifying the data

structure to indicate that the second data is not stored in the second image and

storing the second data in the first image.

30. The apparatus of claim 29, wherein the first storage volume is a first virtual logical unit

(VLUN) and the second storage volume is a second VLUN.

31. The apparatus of claim 29, wherein the means for determining comprises:

means for examining a lookup table to determine whether there is an entry associated

with a data block for the second data, the lookup table being associated with

the second storage image; and

means for deleting the entry associated with the data block if the entry exists.

32. The apparatus of claim 29, further comprising:

means for acquiring a lock from a lock mechanism before modifying the data structure

to indicate that the second data is not stored in the second image; and

means for releasing the lock after storing the second data in the first image.

33. The apparatus of claim 32, wherein the lock mechanism is maintained independent to the first and the second storage images.

34. The apparatus of claim 29, further comprising:

  measns for receiving a third data being written to a data block of the second storage volume;

  means for updating the data structure to indicate the data block is stored on the second storage image; and

  means for writing the third data to the data block on the second image.

35. The apparatus of claim 34, wherein the means for updating comprises:

  means for determining whether the data block is stored on the first storage image; and

  means for updating the data structure to indicate the data block is stored on the second storage image, if the data block is stored on the first image.

36. The apparatus of claim 35, wherein the means for determining comprises:

  means for examining a lookup table to determine whether there is an entry associated with the data block, the lookup table being associated with the second storage image; and

  means for creating the entry associated with the data block if the entry does not exist.

37. The apparatus of claim 34, further comprising:

  means for acquiring a lock from a lock mechanism before the updating; and

  means for releasing the lock after the writing.

38. The apparatus of claim 37, wherein the lock mechanism is maintained independent to the first and the second storage images.

39. The apparatus of claim 29, further comprising:

   means receiving a request to read from a data block on the second storage volume;

   means determining whether the data block is stored in the first image or the second image, based the data structure associated wtih the second storage image;

   means reading the data block from the first image if the data block is stored in the first image; and

   means reading the data block from the second image if the data block is stored in the second image.

40. The apparatus of claim 39, further comprising means for examining a lookup table to determine whether there is an entry associated with the data block, the lookup table being associated with the second storage image.

41. The apparatus of claim 39, further comprising:

   means for acquiring a lock from a lock mechanism before the determining; and

   means for releasing the lock after the reading.

42. The apparatus of claim 41, wherein the lock mechanism is maintained independent to the first and the second storage images.

43. A data storage system, comprising:

   a processing system; and

a memory coupled to the processing system, the memory storing instructions, which

when executed by the processing system, cause the processing system to

perform the operations of:

receiving a command to preserve data in the data storage system;

executing, for a first data, a first input/output (I/O) process directed to a first

storage volume, wherein the first I/O process begins at a first time

which is prior to receiving the command;

creating a data structure, in response to the command, for at least a second

image which corresponds to a second storage volume;

writing a second data directed to the first storage volume as part of a second

I/O process which begins after the first time; and

determining from the data structure whether data corresponding to the second

data is stored in the second image and if it is, modifying the data

structure to indicate that the second data is not stored in the second

image and storing the second data in the first image.

44. The method of claim 1, wherein the second I/O process is capable of accessing the

same data, via the second storage volume, as the first I/O process.

45. The machine-readable medium of claim 15, wherein the second I/O process is capable

of accessing the same data, via the second storage volume, as the first I/O process.

46. The apparatus of claim 29, wherein the second I/O process is capable of accessing the

same data, via the second storage volume, as the first I/O process.